What drives mandatory and voluntary risk reporting variations across Germany, UK and US? *

Tamer Elshandidy**
The University of Bristol

Ian Fraser
The University of Stirling

Khaled Hussainey
The University of Plymouth

The British Accounting Review

Volume 47, Issue 4, December 2015, Pages 376–394

*This paper has benefited from comments and suggestions from participants at the 15th and 16th Annual Conference of the Financial Reporting and Business Communication Research Unit (The University of Bristol, 2011 and 2012), the British Accounting and Finance Association Conference (Aston University, 2011), the 35th European Accounting Association (EAA) Annual Congress (Ljubljana, Slovenia, 2012), the ICAS research workshop (Edinburgh, 2010), and a workshop at the University of Bristol, 2012. We are very grateful to the Editors and two anonymous referees for their constructed comments and useful suggestions. We thank Matt Bamber, Christine Botosan, Ann Beyer, Sheila Ellwood, Moataz Elmasry, Mike Jones, Kate Howie, Nikola Petrovic, and Richard Tutin, Neslihan Ozkan for their helpful comments and suggestions.

**Correspondence should be addressed to Tamer Elshandidy, School of Economics, Finance and Management, University of Bristol, 8 Woodland Road, Clifton, Bristol, BS8 1TN. Email: Tamer.Elashandidy@bristol.ac.uk

Cited as:

Elshandidy, T., Fraser, I., & Hussainey, K. (2015). What drives mandatory and voluntary risk reporting variations across Germany, UK, and US? *The British Accounting Review*, 47(4), 376-394.

What drives mandatory and voluntary risk reporting variations across Germany, the UK and the US?

Abstract

This paper utilises computerised textual analysis to explore the extent to which both firm and country characteristics influence mandatory and voluntary risk reporting (MRR and VRR) variations both *within* and *between* non-financial firms across Germany, the UK and the US, over the period from 2005 to 2010. We find significant variations in MRR and VRR between firms across the three countries. Further, we find, on average, that German firms tend to disclose significantly higher (lower) levels of risk information mandatorily than UK (US) firms. German firms, on average, tend to reveal considerably higher (lower) levels of VRR than US (UK) firms. Our results document that MRR and VRR variations are significantly influenced by systematic risk, the legal system and cultural values. We also find that country and firm characteristics have higher explanatory power over the observed variations in MRR than over those in VRR.

Keywords
Automated content analysis, firm and country characteristics, mandatory and voluntary risk reporting variations, repeated measures multilevel analysis

1. Introduction

This paper investigates the extent to which firm and country characteristics explain variations in mandatory risk reporting (MRR) and voluntary risk reporting (VRR), both *within* and *between* non-financial firms across Germany, the UK and the US during the period from 2005 to 2010. Seeking factors (firm and country characteristics) that interpret variations in MRR and VRR across the three countries answers the calls of Linsley and Shrives (2006) and Dobler, Lajili, and Zeghal (2011) regarding extant gaps in the current body of literature on risk reporting. Each of these countries exhibits a distinctive approach to risk reporting. The first approach (Germany's) is underpinned by a significant emphasis on MRR. The second (the UK's) emphasises voluntary rather than mandatory risk reporting. The third approach (that of the US) represents a compromise between the UK and German approaches.

Consistent with Jorgensen and Kirschenheiter (2003) and (2012), MRR expresses the risk information that firms exhibit within or above, but still related to, risk regulations that set the minimum requirements. VRR expresses any other information about risk included in the narrative sections of annual reports. We measure MRR and VRR with a computer-based approach using QSR version 6, searching the text and counting the number of statements that indicate risk.[1] Automated risk reporting scores are validated manually and statistically to ensure their reliability. Firm characteristics are captured by firm risk levels and some control variables. First, based on the literature examining the association between market and accounting risk measures (e.g., Beaver, Kettler, and Scholes, 1970; Ecker, Francis, Olsson, and Schipper, 2009), we include both market risk measures (market returns volatility, beta and volatility of the standard error of the capital asset pricing model (CAPM) as measures of total, systematic and unsystematic risk, respectively) and accounting risk measures (leverage and current ratio

[1] QSR is a qualitative research software developed for analysing textual data. It has introduced many pieces of software such as NUD*IST in its various versions (1 to 6), which it was later upgraded to NVivo. Our paper relies on QSR NUD*IST version 6, henceforth QSR version 6. NUD*IST stands for Non-numerical Unstructured Data Indexing, Searching and Theorizing. One of the key advantages of using QSR version 6 over NVivo is the flexibility of choosing the unit of coding, as desired, to be either a sentence, a line or a paragraph. Our paper uses the sentence as the unit of analysis to avoid the double-counting problem (Kravet and Muslu, 2013), which is a weakness inherent in other dictionary-based software programs (e.g., General Inquiry). For a recent review see Li (2010).

as measures of financing and liquidity risks, respectively). Based on the literature looking at variations in disclosure practices (e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998; Jaggi and Low, 2000; Hope, 2003), we utilise legal systems and cultural values to capture the country characteristics.

For both the level 1 (*within* firms) and level 2 (*between* firms) analyses, we apply repeated measures multilevel analysis (Hox, 2010; Dong and Stettler, 2011) in order to capture variations in MRR and VRR and then associate those variations to firms' risk levels. This analysis combines cross-sectional with time-series data, and accounts for residual dependency (Gow, Ormazabal, and Taylor, 2010).

Although considerable attention has been paid to risk reporting recently, the majority of the research focuses on a single country (e.g., Linsley and Shrives, 2006; Li, 2008), or is heavily restricted to one category of risk reporting (e.g., foreign exchange rate disclosure (Marshall and Weetman, 2002, 2007), MRR (Li, 2008) or aggregated risk reporting (Linsley and Shrives, 2006)). None of this research takes as its principal aim the examination of how and to what extent underlying risk levels influence the different levels of risk reporting firms exhibit in their annual report narratives, nor does any of it investigate how country-level characteristics influence the nature and extent of MRR and VRR.

In a recent and highly relevant piece of multi-country research, based on 40 manufacturing firms from Canada, Germany, the UK and the US in 2005, Dobler et al. (2011) investigate the key characteristics of firms providing aggregated risk disclosure, and their association with the regulations in the countries. They do not distinguish, however, between MRR and VRR, although Germany and the US are more highly regulated than the UK with respect to risk reporting. This suggests that MRR will dominate VRR in both Germany and the US to a much greater extent than in the UK. Their results do not support the underpinning argument that firms should respond sensibly to their underlying risks by revealing risk information.

A firm's choices on whether to engage in disclosure activities are not always directly related or restricted to the economic incentives generated by market forces (e.g., Aguilera and Cuervo-Cazurra, 2004; Chen and Roberts, 2010; Judge, Li, and Pinsker, 2010). Neo-institutional theory comprises both institutional and market pressures, and explains why firms might vary in their response to regulations or even to the best practices among their competitors (e.g., Aguilera and Jackson, 2003). Based on this

theory, the rational logic behind exhibiting risk information mandatorily and/or voluntarily stems from different levels of pressure generated from regulations and/or best practices, encouraging firms to respond so as to meet social norms and be acceptable (e.g., Chen and Report, 2010).

Our results, based on 3,685 firm-year observations, show significant variations in both MRR and VRR *within* and *between* firms over 2005 to 2010, across the three countries. We find the variations in MRR and VRR to be significantly associated with systematic risk, the legal system and cultural values. We also find that the latter two are significantly more essential in explaining variations in MRR than VRR.

This paper makes several contributions to research on risk reporting. First, we observe changes over time in both MRR and VRR, and then associate such changes with variations in risk levels captured through a comprehensive set of market and accounting risk measures. Second, to the best of our knowledge, we are investigating these associations on the largest set of data used within risk reporting research to date. When we further associate the observed trend in firms' MRR and VRR with the underlying risks in each country, we find signals that either support or warn the German, UK and US regulators regarding their approaches to risk reporting. Given that each approach supports a particular type of risk reporting, the extent to which the underlying risks motivate managers to respond sensibly by reporting risk information either mandatorily or voluntarily becomes the main criterion for assessing the approaches. Finally, based on simultaneous interactions between, and the influence of, firm and country characteristics, this paper provides the first empirical evidence of how corporate risk reporting varies within and between firms under the three distinct approaches to risk reporting taken in Germany, the UK and the US. The observed pattern of VRR variations within and between firms across these countries differs from the variations in MRR. This conclusion has theoretical and practical implications:

Theoretically, either general disclosure research or risk reporting research might usefully distinguish between the trends in mandatory and voluntary risk reporting, avoiding the misinterpretations due to relying on the aggregated disclosure score, so as to draw conclusions about either VRR or MRR. In practical terms, the higher ability of legal and cultural values to explain MRR

variations across countries than VRR variations, the latter being significantly more correlated to firm characteristics, has implications for the current efforts towards international convergence. In essence, any attempt to minimise differences in risk reporting practices should take each country's legal system and cultural values into consideration.

The remainder of the paper is organised as follows: The following section discusses the theoretical background. Section 3 introduces relevant prior literature and develops the hypotheses. Section 4 explains the research methods. The results are discussed in Section 5. Section 6 provides conclusions, discusses limitations and suggests areas for future research.

2. Theoretical framework

The neo-institutional theory suggests that an organisation seeks to gain legitimacy through institutional and market pressures within their business environment (DiMaggio and Powell, 1983; Scott, 1995:25). In this theory, firms are considered part of a social system that interacts with the society, and they aim to reduce uncertainty and ensure survival and growth (Aguilera and Jackson, 2003; Chen and Report, 2010). The neo-institutional theory argues that an organisation, as a community group, encompasses three main pillars: *regulative*, *mimetic* and *normative* (Scott, 1995:35). These pillars generate pressures to which individual organisations respond. Organisational adoption of risk regulations and/or best practices might vary due to competition, institutional environments, and the intensity of those environments. Responses to such factors shape organisations' decisions on whether to withhold or reveal risk information, mandatorily and/or voluntarily. While those decisions might be dominated by one particular pillar (pressure), the others are likely to work alongside it (e.g., Judge, Douglas, and Kutan, 2008). Consistent with that, the preference towards exhibiting risk information either mandatorily (the German and US approaches) or voluntarily (the UK approach) does not eliminate the role of voluntary or mandatory risk disclosure in those countries, respectively.

These three institutional pressures, *regulative*, *mimetic* and *normative,* create an institutional context for firms' disclosure, where managers can engage in more mandatory and/or voluntary disclosure. The *regulative* or *coercive* pressure encourages managers to comply with mandatory risk disclosure, while the

mimetic and/or normative pressures generate more engagement with voluntary risk disclosure. Compliance with risk regulations, though, might require firms to disclose more risk information voluntarily so as to clarify different aspects, as regulations can be ambiguous or context-neutral (Weaver, Trevino, and Cochran, 1999).

Principally, *regulative* or *coercive* pressure, which stems from the legal and political power exerted by the state (DiMaggio and Powell 1983; Scott, 1995:35), is likely to affect firms' decisions to reveal risk information mandatorily. Firms' legal environment is a prime example of such coercive pressure, where the authority of the law is normally above the firms' organisational authority. Recently, there have been many changes to the regulations as the legal environment has become more pervasive, requiring structural changes from firms to enrich their information environments and meet the demands. With these developments, firms are seeking to demonstrate their response to the changes and thus gain legitimacy (Chen and Roberts, 2010).

In Germany, the German Accounting Standards Board (GASB) have published GAS 5, which deals with risk reporting, making Germany the only country to have attempted to organise risk reporting by formally issuing an accounting standard. GAS 5 emphasises the disclosure of firms' residual risks, especially industrial and market risks, and any other risks having a significant impact on a firm's existence. All disclosure should be made in a specific section of the annual report narrative (normally under *Risks and Opportunities* or *Outlook*).[2] The German approach to risk reporting can be summarised as follows: Firstly, GAS 5 is the only formal accounting standard dealing comprehensively with both the measurement and disclosure of firms' risks. Secondly, while GAS 5 formally mandates specific requirements for risk reporting, it nevertheless encourages German firms to reveal more risk information voluntarily.

In the US, the Securities and Exchange Commission (SEC) published Financial Reporting Release (FRR) No.48 on the market risk of financial instruments in 1997. It deals with how listed firms should disclose the market risk of their financial instruments. There are three distinctive aspects of the

[2] Despite the fact that listed German firms are formally required to fully adopt the International Financial Reporting Standards (IFRS), the Accounting Standards Committee of Germany (ASCG) explains that German firms shall continue to apply GAS where the international accounting principles do not include any requirements. This holds for GAS 5.

US approach to risk reporting. First, firms provide either mandatory or voluntary risk information, in either quantitative (risk mapping, value at risk and sensitivity analysis) or qualitative formats, with particular attention paid to MRR. Second, this approach has influenced previous research on risk reporting (the following section provides more details) that principally focuses on associating risk reporting (especially the market risk of financial instruments) with either various accounting measures (e.g., future earnings and future cash flow) or the qualitative characteristics of financial information (e.g., comparability, relevance and reliability).

Similarly, *mimetic* pressure, caused by the need to respond to uncertainty by looking at how rivals handle such uncertainty, and *normative* pressure, which arises from professional bodies' initiatives and norms (DiMaggio and Powell, 1983), are likely to affect firms' decisions on whether to reveal risk information voluntarily.

In the UK, the Institute of Chartered Accountants in England and Wales (ICAEW) has produced several non-mandatory publications on risk reporting, discussing how firms can report risk information in their annual report narratives (ICAEW, 1997), highlighting the beneficial effects of risk disclosure for the cost of capital (ICAEW, 1999), identifying practical problems in disclosing risk information, and suggesting improvements (ICAEW, 2011). The main features of the UK approach to risk reporting are that (1) VRR is preferred, on the basis that it improves the quality of accounting information and reduces the cost of capital, and (2) each firm can identify all of its risks individually and accurately rather than having to follow a list of risk types.

In the following section, the insights from the neo-institutional theory will be incorporated with relevant literature in the forming of our hypotheses.

3. Relevant literature and hypothesis development

3.1. Firm characteristics within Germany, the UK and the US

3.1.1. Market risk measures and variations in MRR and VRR

It has been argued that accounting earnings variability has historically been the accounting variable most strongly correlated to systematic (non-diversifiable) equity risk (Ryan, 1997). Consequently, it is

considered very useful for firms to increase the amount of information they provide about the sources and amount of this variability; this can be achieved if they provide more information about fair value measurement. According to the CAPM, future corporate cash flows reflect both market-wide and firm-specific risk. In terms of the former, Jorgensen and Kirschenheiter (2003) propose the managers' strategies model as a way to provide risk information, relying on the variance in future cash flows, according to the SEC's requirements for market risk. They conclude that voluntary disclosures affect firms' returns, betas and share prices. In terms of firm-specific risk, Jorgensen and Kirschenheiter (2012) propose a theoretical model to analyse the consequences of firms' mandatory disclosure of future cash flow sensitivity. The theoretical model of Bagnoli and Watts (2007) suggests that the cross-sectional variations in voluntary disclosure depend on the cross-sectional variations in the market's uncertainty.

In a recent work, Abraham and Shrives (2014) argue that two competing approaches that might explain why firms exhibit risk information in their annual report narratives. The first, the *mimetic aspect* of institutional theory, argues that risk disclosure is likely to be less useful due to managers engaging in risk disclosure as a routine activity. Thus, disclosure is likely to be symbolic rather than substantive in nature, and, as a consequence, it will not change over time as any change would attract unwelcome attention. They further claim that this theory suggests the possible occurrence of decoupling, suggesting that real risks are not reflected in risk disclosure. Because disclosure does not reflect reality, there is no need for managers to revise it. Based on this theory, firms are unlikely to disclose risk information when other companies fail to do so. The second competing approach, the *normative aspect* of institutional theory, argues that risk disclosure should be amended over time as firms' risks change over time. Risk disclosure, therefore, should be discussed in light of the previous year's disclosure to confirm its coherence and authenticity. Based on institutional theory, managers are like to disclose more risk information to describe their ex ante risks.

Consistent with the first approach, Li (2008) finds that US firms providing more disclosures, captured through a text search for the words 'risk' and 'uncertainty', relating to future risks are more likely than other firms to exhibit negative future returns. He concludes that the stock market does not

fully reflect, and is thus inefficient in reflecting, the risk content in future earnings. In contrast, Kravet and Muslu (2013) find, consistent with the second approach, that textual risk disclosure on form 10-K is likely to increase the investor-perceived risk, as proxied by volatility and beta measuring total and systemic risk respectively, suggesting that such disclosure reveals new risk factors to the market. Consistent with that, Campbell, Chen, Dhaliwal, Lu, and Steele (2014) find that disclosed risk information has a significant impact on market value and risk levels, and conclude that risk information is firm-specific and useful to investors. They also find that textual risk disclosure in section 1.a (*risk factors*) of form 10-K is significantly associated with risk levels.

Similarly, the association between risk levels and risk reporting levels can be hypothesised to be either positive or negative (Linsley and Shrives, 2006). A positive relationship may reflect managers in higher-risk firms wanting to explain how they manage these higher risks successfully. A negative relationship may be rationalised on the basis of higher-risk firms not wishing to attract market attention. Linsley and Shrives (2006), however, find that risk reporting levels reflect firm size more than they do firm risk. Likewise, Hill and Short (2009) do not find risk levels to impact significantly on the provision of risk information.

However, Marshall and Weetman (2002) suggest that higher-risk firms are comparatively more likely to disclose risk. Abraham and Cox (2007) also find a positive association between risk levels and risk reporting. Elshandidy, Fraser, and Hussainey (2013) reveal that higher-risk firms are more sensitive to underlying risk levels in terms of both MRR and VRR, and that firms exhibiting greater compliance with mandatory regulations have a greater propensity to report risk voluntarily. However, Dobler et al. (2011) do not find a significant association between firm risk, proxied by beta, and its aggregated risk reporting level.

We argue that firms are likely to respond to the pressure that arises from an increase in risk by exhibiting more risk information to meet social expectations and be socially acceptable. Firms will have a motive to be consistent with similar firms that respond to high levels of risk by disclosing more risk information. This reassures, as a *confirmatory* role, their investors about their ability to identify and manage those risks effectively, raising their status (e.g., Chen and Roberts, 2010). In such a structure, a

firm that seeks to be perceived as legitimate is likely to be *mimetic* and *normative*. This leads to the following hypothesis:

H1a: Variations in MRR and VRR within and across Germany, the UK and the US are likely to be positively associated with firm risk levels (as proxied by market risk measures).

3.1.2. Accounting risk measures and variations in MRR and VRR

Prior risk research uses leverage as a proxy for a firm's risk level (Linsley and Shrives, 2006; Abraham and Cox, 2007; Marshall and Weetman, 2007; Hill and Short, 2009; Elshandidy et al., 2013). The results are mixed: Abraham and Cox (2007) and Linsley and Shrives (2006) find no significant association between leverage and risk disclosure. Marshall and Weetman (2007) suggest that high-leverage firms are likely to provide foreign exchange risk disclosure. More recently, Dobler et al. (2011) find that high-leverage US firms are likely to provide more risk disclosure in their narratives than high-leverage German firms. Their findings do not support any influence from leverage on risk disclosure for UK firms, however.

Marshall and Weetman (2007) argue that low-liquidity firms (high liquidity risk) are more motivated than other firms to provide higher levels of risk information. However, their findings suggest that high-liquidity firms provide more foreign exchange risk information in order to signal their strong position to investors since they are under less critical scrutiny regarding liquidity risk. As a result, they are more willing to provide information on their hedge strategies and foreign exchange activities. Hill and Short (2009) find that high-leverage and low-liquidity firms disclose more risk information. Elshandidy et al. (2013) find that highly liquid and leveraged firms are more likely to make voluntary risk disclosure. This leads to the following hypothesis:

H1b: Variations in MRR and VRR within and across Germany, the UK and the US are likely to be positively associated with firm risk levels (as proxied by accounting risk measures).

3.2. Country characteristics

A sizable amount of research (e.g., Nobes, 1998; La Porta et al., 1998; Jaggi and Low, 2000; Hope, 2003; William, 2004; Ding, Hope, Jeanjea, and Stolowy, 2007; Dong and Stettler, 2011) has been conducted on factors that might explain international differences in accounting practices. Among the

many factors studied, countries' legal systems and cultural values are claimed to be most essential. Based on the neo-institutional theory, Judge et al. (2008) argue that, the stronger are the laws within a nation and the more the national culture emphasises competitiveness, the greater is the perceived legitimacy of its governance. On that basis, these institutional characteristics might influence firms' behaviour towards revealing risk information to improve their legitimacy.

Whether a country belongs to the set of common law or code law countries is a reflection of its legal origins and determines the level of detail in its measurement and disclosure practices (e.g., Nobes, 1998) and investor protection (e.g., La Porta et al., 1998). In common (code) law countries such as the US and the UK (Germany), firms tend to be more transparent (secretive) and place a higher priority on protecting investors (creditors). Ding et al. (2007) find that the differences observed between domestic and international accounting standards are significantly influenced by legal systems, shedding light on the latters' impact, among other institutional factors, on the efforts to adopt a single set of accounting standards across the globe.

The national culture is another institutional factor that influences both managers' (preparers') choices and investors' (users') preferences regarding financial reporting (e.g., Hope, 2003). Hofstede (1991) and (2001) proposes five dimensions that have been used widely in prior accounting research to examine the impact of culture on accounting (for an extensive review see, e.g., Doupnik and Tsakumis, 2004). These dimensions, defined in Table 1, are power distance (PD), uncertainty avoidance (UA), individualism (IND), masculinity (MAS), and long-term orientation (LTO).

Based on Hofstede's scores, as shown in Table 1, the US and the UK show some similarities in cultural values, but Germany differs somewhat. Specifically, it seems to differ greatly in IND and UA. The lower and respectively higher scores for IND and UA in Germany relative to the US and UK reflect that the German national culture places more of a premium on safety, predictability, faithfulness to an established system of rules and regulations, and high conservatism compared to the American and British cultures (Haskins et al., 1996: 480). The relatively low scores for PD in Germany and the UK suggest that their firms will have a relatively higher preference for authority than individuality, compared with US firms. The lower scores for LTO in the British and American cultures than in the

German culture indicate the latter's preference for thrift and large amounts of savings (Haskins et al., 1996: 481).

Ding et al. (2005) provide evidence that cultural values are essential to the harmonisation of accounting practices in general. Regarding disclosure practices, Zarzeski (1996) hypothesises and finds that all of Hofstede's (1991) dimensions to have a significant impact on disclosure, expect for PD.

Without observing the pattern of either combining or dis-combining the analysis with legal and/or cultural values variables, Williams (2004) finds that firms from common law countries were more likely to provide higher disclosure levels of than firms in code law countries. PD is the only cultural dimension that significantly explains the variability in firms' disclosures. Jaggi and Low (2000), however, argue that the cultural factors of a country have an indirect impact on financial disclosures through its legal system, based on prior research on the effect of legal systems on accounting practices (e.g., La Porta et al., 1998). Dong and Stettler (2011) find significant impacts of both legal system and cultural values (with the exception of UA) on aggregated disclosure.

Based on Jaggi and Low (2000)'s argument, Hope (2003) provides empirical evidence on the importance of the legal system as a conditioning variable for the role of cultural values. In his full sample, he finds that culture has a limited role in explaining disclosure variability. Once he distinguishes common from code law countries, however, he finds that, in the case of common law countries, all cultural dimensions are significantly associated with disclosure. In the case of code law countries, he finds that all cultural variables except PD are significant in explaining the variability of disclosure.

In risk disclosure research, Erkens (2012) explains that legal systems are pre-determined and emerge as a result of cultural values, and argues that risk disclosure can be seen as a function of a country's legal system and its cultural values. He finds that legal systems and cultural values are significantly correlated with variations in MRR and VRR. Based on this discussion, we formulate the following hypothesis:

H2: Country characteristics (legal system and cultural values) have explanatory power over the observed variations in MRR and VRR across Germany, the UK and the US.

4. Method

4.1. Data collection and sample selection

Thomson One Banker is used to obtain a list of Frankfurt (CDAX), FTSE, and NASDAQ all-share firms. As in prior research (Linsley and Shrives, 2006; Abraham and Cox, 2007), financial firms and cross-listed firms are excluded due to their distinctive regulations and accounting practices, and to avoid dual requirements on risk reporting across countries. These criteria yield a list of 716 German, 339 UK and 1,680 US firms. We then re-sample the 1,680 US firms randomly to be consistent with the UK sample size. Meanwhile, the existence of English or English/German annual reports is the main criterion used to re-sample the German list so as to avoid any bias caused by comparing different languages (Dobler et al., 2011). Additionally, Campbell, Beck, and Shrives (2005) find that annual reports translated from German to English convey the same content as the originals. Accordingly, we derive a final sample of 219 German, 339 UK and 320 US firms.

Annual reports for UK and German firms are collected from either Thomson One Banker or the company's website, and 10-Ks for the US firms are obtained from the historical SEC EDGAR. All reports are for financial years ending within the period from 30 June 2005 to 30 June 2010. We focus on annual reports since these remain a primary source of information for investors (see, e.g., Elshandidy et al., 2013). The time period reflects IFRS becoming mandatory for UK and German listed companies in 2005.

All annual reports are converted into text files so as to be readable by QSR version 6. We therefore exclude annual reports that cannot be converted into text files (15 from German firms, 16 from UK firms and 15 from US firms). All firms without a complete time series of both annual reports and market data are also excluded (4 German firms, 41 UK and 51 US). The final sample size is 1,000 German, 1,410 UK and 1,270 US firm-years.

4.2. Measuring MRR and VRR using automated content analysis

4.2.1. Automated content analysis

The process used to measure both MRR and VRR is shown in Figure 1. In order to identify the number of statements indicating risk, we first construct a comprehensive list of risk-related keywords,

relying initially on the risk word list proposed by Elshandidy et al. (2013). Our list contains the following: against, catastrophe (catastrophic), challenge (challenges), chance (chances), decline (declined), decrease (decreased), differ*, diversify*, fail (failure), fluctuate*, gain (gains), increase (increased), less, loss*, low*, peak (peaked), probable*, risk*, shortage, significant*, threat, unable, uncertain (uncertainty; uncertainties), reverse (reversed) and viable. Words marked with a * also include derivatives of the original. The words are generated on the basis of an adopted definition of the term *risk* as variations or fluctuations around a target value (e.g., Linsley and Shrives, 2006). This definition includes both potential gains or opportunities and potential losses, threats or danger.

[Insert Figure 1 about here]

Second, for the US and Germany, we eliminate all sections indicative of mandated risk reporting, according to the SEC's requirements in the US (item 1.a for *Risk Factor*; 7.a for *Quantitative and Qualitative Disclosure about Market Risk*), and GAS 5's in Germany (the sections on *'Risks and Opportunities' or 'Outlook'*). While these sections indicate MRR, (denoted MRR_I), according to these requirements, there are some possibilities for US and German firms to disclose information about aspects related to MRR, (denoted MRR_V), in other annual report narrative sections as well. In these other sections, firms mainly provide their VRR, but can also disclose information about risks related to mandated themes or topics.[3] The following keywords, therefore, cover those mandated themes or topics: contingence (ies), derivative or financial instrument(s), fair value(s), foreign currency or foreign exchange, investment(s) and segment(s). The total mandatory risk disclosure score in the US and Germany is then calculated as the sum of the total number of sentences indicating risk (e.g., containing any of the keywords) in the mandated sections and the total number in the other narrative sections of the annual report. For UK firms, we search the full annual report to obtain MRR, as there are no mandated sections in the UK's annual report.

[3] Although neither the UK Accounting Standards Board (ASB), the International Accounting Standards Board (IASB) nor the Financial Accounting Standards Board (FASB) has published accounting standards specifically on risk reporting, the latter is addressed by several accounting standards. Six principal mandated themes or topics related to risk that are addressed by the ASB, the IASB and FASB are as follows: contingencies (FRS 12; IAS 37; FAS 5), segment reporting (SSAP 25; IFRS 8; FAS 14), foreign exchange (FRS 23; IAS 21; FAS 52), the substance of transactions or investments (FRS 5; IAS16; FAS 115), derivatives (FRS 13, 25, 26, 29; IAS 32, 39 and IFRS 7; FAS 133), and fair value (FAS 157).

We use the special command instructions of QSR version 6 and design an automated program to search for our risk word list. We count all statements containing at least one risk-related word from both the mandated annual report sections (the US and Germany only) and the voluntary sections (all three countries). Statements of risk in the voluntary sections are used as a proxy for the firms' aggregated risk reporting scores. To differentiate between voluntary and mandatory statements in the full annual reports of the UK firms, or in the other narrative sections of the annual reports of the US and German firms, we exclude the total mandatory risk score for UK firms, or MRR_V for the US and German firms from the aggregated risk scores to determine VRR for the UK, US and German firms.

4.2.2. Reliability and validity of risk reporting scores

The reliability and validity of the risk reporting scores are tested in two stages. First, we examine the extent to which the final word list captures statements with a risk focus. To this end, we read 30 randomly selected statements from the QSR version 6 output for 15 firms in each country from the year 2007. We find the final risk keyword list to be largely successful (80% on average) in identifying statements indicative of risk in each country. Second, after calculating the final risk reporting scores, we carry out two post hoc procedures. In the first, we review the statements from the first stage manually, in terms of the word list's ability to discriminate between MRR and VRR. We find, based on reviewing the aforementioned 30 statements for each of the 15 firms in each country, that the keywords are able to differentiate reasonably between these disclosures in around 77% of cases (on average).

The second test uses Cronbach's alpha, which provides a statistical measure of how well a dataset captures a particular underlying construct, to validate the MRR and VRR scores. Specifically, it indicates the MRR and VRR scores' consistency and how well they reflect risk disclosure. As a rule, Cronbach's alpha will increase as the inter-correlation among MRR and VRR increases, providing an internal consistency estimate of the reliability of the risk disclosure scores. The inter-correlations among the risk disclosure scores will be maximised when all items measure the same construct. For the computed risk reporting scores, Cronbach's alpha is around 70% for the US and around 85% for the UK and Germany, which is acceptable given the generally agreed upon social science measure of 70% (e.g., Abraham and Cox, 2007). We conclude that the computed risk reporting scores are reliable.

4.3. Empirical model

We use repeated measures multilevel analysis to associate the firm characteristics (firm risk levels and other firm characteristics) and country characteristics (legal system and cultural values) with the variations in MRR and VRR *within* each firm (level 1) over the period from 2005 to 2010, and *between* different firms over these years (level 2), in Germany, the UK and the US.[4]

$$RR_{tij} = \beta_{0ij} + \beta_{1ij} Z_{tij} + \beta_{2ij} Z^2_{tij} + \sum_{q=1}^{Qr} \beta_{rq} Xfl_{qij} + \sum_{q=1}^{Qo} \beta_{oq} Xfl_{qij} + \sum_{q=1}^{Qc} \beta_{cq} Xcl_{qij} + \varepsilon_{tij} + r_{ij} \qquad (1)$$

where RR_{tij} is the risk reporting (MRR or VRR) of firm *i* in country *j* in year *t*. β_{0ij} is the intercept of firm *i* in country *j*. β_{1ij} and β_{2ij} are the slopes of the time-varying variables applying to firm *i* in country *j*. Z_{tij}, and Z^2_{tij} are the linear and quadratic components of time for firm *i* in country *j* at time *t*. These two components are the main parameters at level 1 as shown under the null model and they are given according to polynomial curves.

At level 2 of the repeated measures analysis, β_{rq} and β_{oq} represent the effects of Xfl_{qij} on both the linear and quadratic components of time of MRR and VRR. Xfl_{qij} is a function of the firm characteristics, including risk (total (TR), systematic (SR), unsystematic (USR), financing (FR) and liquidity (LR)) and other firm characteristics/controls (firm size (SE), profitability (PE), growth (GE), dividends (DE) and industry type (IE)).[5]

We control for these effects for a number of reasons. First, previous research shows firm size to be positively associated with general disclosure levels (e.g., Ahmed and Courtis, 1999; Chavent, Ding, Stolowy, and Wang, 2006). Similarly, Linsley and Shrives (2006) and Abraham and Cox (2007) find aggregated and voluntary risk reporting to be significantly and positively correlated with firm size. Second, prior studies on general voluntary disclosure (Wallace and Naser, 1995; Chavent et al., 2006) suggest that firms with higher profitability may provide comparatively more risk information. Third, Khurana, Pereira, and Martin (2006) argue that, as disclosure enhances the ability to obtain external

[4] This aggregate equation combines levels 1 and 2, where level 1 variations occur *within* firms as a function of time and standard error, and level 2 variations occur *between* firms, based on the direct impact of the firm indicators on the intercept and growth rate.

[5] For firm characteristics, we use a rank transformation for all variables proxied by ratios (TR, SR, USR, FR, LR, PE, GE, and DE) to improve the distribution of these ratio variables, as suggested by much of the prior research (e.g., Conover and Iman, 1980; Baginski and Wahlen, 2003).

financing by reducing information asymmetry, firm growth is likely to raise disclosure levels. This is supported by their empirical evidence, and that of Chavent et al. (2006). Fourth, empirical research (e.g., Deshmukh, 2005; Li and Zhao, 2008) carried out in the US finds that firms characterised by low information asymmetry are more likely to pay higher dividends. Wang and Hussainey (2013) reveal a positive association between future-oriented information and dividends, for UK firms. Lastly, firms from the same industry are likely to make similar levels of disclosure; when firms act inconsistently with industry expectations, the market might perceive them to be concealing either important information or bad news. Prior research on both general (Beattie, McInnes, and Fearnley, 2004; Dong and Stettler, 2011) and risk (Elshandidy et al., 2013; Erkens, 2012) disclosure finds empirical evidence that the disclosure level varies across industries. Additionally, and consistent with Kravet and Muslu (2013), we control for the length of the annual reports by including a model with the total number of sentences in the annual report.

β_{cq} stands for the effects of Xcl_{qij} in code law (and respectively low cultural score) countries relative to those in common law (and high cultural score) countries (as the reference groups) on the linear and quadratic components of time of MRR and VRR. Xcl_{qij} is a function of the country characteristics, namely, legal system and cultural values. Table 1 explains the definitions of these variables, their sources and their codes. ε_{tij} and r_{ij} are the standard errors of level 1 and level 2, respectively.[6]

[Insert Table 1 about here]

5. Empirical results

5.1. Descriptive statistics

Table 2, which reports descriptive statistics of the main variables for Germany, the UK, and the US, suggests that, on average, US firms exhibit higher levels of MRR than UK (by 37%) and German (by

[6] The error structure at either level 1 (ε_{tij}) or level 2 (r_{ij}) is an essential consideration in all of the above equations. The error or residual of level 1 is the variability between the estimated and actual values of MRR/VRR *within* firms over time. The error structure of level 2 (r_j), however, can be explicitly reflected through a random effect at that level, which, in turn, might contain a random intercept, a random linear slope and covariance between the intercept and the linear slope. In order to test whether and the extent to which the residuals either lack normality or are influenced by outliers, we carry out some further checks. The Q-Q plot for standardised residuals and predicted values of MRR and VRR visually supports the validation of the normality assumption. We then use summary statistics for those two variables, namely, by looking at whether mean, median and skewness together indicate normality.

16%) firms. UK firms, in contrast, exhibit, on average, 3% more VRR than US and 2% more than German firms. The results suggest that, in all three jurisdictions, managers have incentives to provide extra risk information voluntarily, along with their mandatory disclosures. Managers may combine VRR with MRR to maximise risk reporting levels. These results are further confirmed by examining whether the observed differences are economically and statistically significant. Both parametric (ANOVA) and non-parametric (Kruskal-Wallis) tests, not reported, document significant differences in MRR and VRR between firms across the three countries, at a p-value of 0.000, suggesting that, throughout our three-country sample, firms vary significantly in their levels of MRR and VRR.

To break these differences down to comparisons between each pair of countries, we further conducted parametric and non-parametric univariate analyses using the Bonferroni and Mann-Whiteney tests, respectively (unreported). The findings suggest that, on average, UK firms are likely to exhibit greater levels of VRR than either US or German firms, at a p-value of 0.000. German firms, though, tend to reveal, on average, significantly more information about their risk voluntarily than do US firms, at a p-value of 0.000. Based on these results, it seems that in the highly regulated risk reporting country of Germany, firms tend to exhibit, on average, significantly higher levels of MRR than in the UK, but lower levels than in the US; German firms, though, are likely to reveal, on average, significantly higher levels of VRR than US firms. The results also suggest that, US firms, which exhibit significantly higher levels of MRR than UK firms, are also likely to exhibit considerably lower levels of VRR than UK firms. This behaviour can be explained by the US firms wanting to compensate their investors for their lower levels of VRR by increasing their levels of MRR, which is consistent with the main regulatory trend in the US.

[Insert Table 2 about here]

In terms of the comparison between disclosure types in each country, Table 2 also indicates that German firms disclose 50% more VRR than MRR on average. This is perhaps surprising, since mandatory disclosure might be expected to dominate voluntary in the highly regulated German environment. One of the most likely explanations for this result is that, by adopting GAS 5, the German environment is probably encouraging managers to exhibit both a high compliance with the

risk regulations and to reveal more voluntary risk information. UK firms disclose, on average, 86% more VRR than MRR. As a consequence of their larger voluntary disclosures, the fluctuations, as indicated by the standard deviation, in VRR are higher than those in MRR among the German and UK firms. The US firms exhibit, on average, 16% more MRR than VRR. The fluctuations in MRR are twice those in VRR. To examine these observed fluctuations, we again conduct a parametric t-test and a non-parametric Mann-Whitney analysis. The unreported results suggest that German and UK (US) firms are, on average, likely to reveal more VRR (MRR) than MRR (VRR), at a p-value of 0.000.[7] These results are consistent with our main conclusions derived earlier from the descriptive statistics.

The above results indicate that managers in highly regulated environments, such as the US, have motives to reveal risk information, essentially through the approach desired by the regulators (MRR), and then may maximise their overall reporting through the other form of disclosure (VRR). Managers in less regulated environments, such as the UK, meanwhile, are highly motivated to reveal risk information, essentially through the approach desired by the regulators (VRR), and then may maximise their overall reporting through the other form of disclosure (MRR). When dealing with a formal risk reporting standard, as in Germany, managers use both forms to maximise their overall disclosure as a response to risk levels.

The above discussion highlights the interaction between mandatory and voluntary risk disclosures, and suggests that these two forms are likely to be complements rather than substitutes for one another. Consistent with this conclusion, when MRR is regressed on VRR, and vice versa, our results (not reported) suggest, first, ceteris paribus, that German and UK (US) firms tend to use VRR significantly to complement (substitute for) MRR. Second, our results suggest, ceteris paribus, that German and UK (US) firms tend to use MRR significantly to complement (substitute for) VRR. These findings are consistent with Bagnoli and Watts (2007)'s argument for a complementary rather than substitutive relation between mandatory and voluntary disclosures. Their results are in line with Einhorn (2005)'s findings that emphasise the interaction between mandatory and voluntary disclosures.

[7] Unreported results are available upon request from the corresponding (principal) author.

As can be deduced from Table 3's Pearson and Spearman correlation coefficients, the parametric and non-parametric coefficients indicate a significant relation between MRR and VRR, at a p-value of 0.000.[8] This result suggests that managers who exhibit high compliance with risk reporting regulations in Germany, the UK and the US have higher incentives to provide high voluntary risk disclosure as well. This result is consistent with Elshandidy et al. (2013) and Dye (1986), and supports the theory that MRR complements VRR. The significant associations between these two variables and the other variables are consistent with prior empirical risk reporting research (e.g., Linsley and Shrives, 2006; Abraham and Cox, 2007; Elshandidy et al., 2013). This consistency validates this paper's MRR and VRR scores.

[Insert Table 3 about here]

5.2. Repeated measures multilevel analysis results: Testing H1 and H2

This section discusses how firm and country characteristics explain variations in MRR and VRR *within* and *between* firms over the period from 2005 to 2010, across Germany, the UK, and the US, relying on repeated measures multilevel analysis. The results are shown in Tables 4 and 5, indicating the value and significance of the coefficients of all explanatory variables under eight different models. The first (null) model shows variations in MRR and VRR from 2005 to 2010 without explanatory variables or predictors, serving as a baseline for appraising. Model 1 incorporates the risk variables (TR, SR, USR, LR and FR) and control variables (SE, PE, GE, DE, LE, and IE). Models 2 to 6 incorporate the abovementioned risk and control variables and the dummy variable for the legal system of the country in question. Each one also includes one of Hofstede's five cultural dimensions. Model 7 introduces the lagged values of the market and accounting risk measures, as explained in Section 5.4, to account for endogeneity.

[8] We checked for multicollinearity statistically by calculating the condition index, which is the square root of the maximum eigenvalue divided by the minimum eigenvalue. If this index is more than 30, the variable has a severe multicollinearity problem (e.g., Gujarati, 2004:365). We checked this, and found that none of the explanatory variables had this problem.

After that, each table identifies the level 1 and 2 variances, namely, the degree of risk reporting variation at each level based on the intra-class correlation (ICC).[9] In order to identify what proportion of the variances in MRR and VRR can be accounted for by the explanatory variables, we calculate adjusted-R^2 at levels 1 and 2. To assess the accuracy of any two models, the differences in the -2 Log Likelihood (-2LL) between each model and the null model may be considered. A decrease in the difference suggests an improvement in the model. The change in the chi-square may be used to examine a null hypothesis of no variations in risk reporting *within* and *between* firms over the period from 2005 to 2010 across the countries. If the difference between the -2LL for Model 2 and that for the null model is greater than the value of the change in the chi-square, Model 2 is then statistically acceptable. The detailed empirical results are discussed in the following subsections.

5.2.1. The impact of firm and country characteristics on MRR variations: Testing H1 and H2

The null model (Table 4) indicates that 21% of the MRR variations are variations *within* the firms over time (level 1), whereas 79% of the MRR variations (78% in the intercept and 1% in time) are *between* the firms (level 2); both of these results are significant at a p-value of 0.000. This significance indicates a possibility of explaining such variations further by including firm characteristics (risk and control factors in Model 1) and country characteristics (legal system and cultural factors in Models 2 to 6).

[Insert Table 4 about here]

Model 1 (Table 4) indicates that both total and unsystematic risks are significantly associated with MRR variations, at p-values of 0.038 and 0.017, respectively. This result indicates that the provision of MRR is significantly influenced by both firm-specific (unsystematic) and overall (total) risk. The risk regulations in these countries do not set a maximum limit on the risk information that should be included in firms' narratives and as those firms might under the regulative pressure as argued by the neo-intuitional theory to the extent to which those firms are likely to provide more mandated risk information. Our results support Dobler's (2008) theoretical argument in which he calls for further

[9] The ICC is the proportion of variance in either MRR or VRR at level 1 (within each firm over 2005 to 2010) and at level 2 (between the firms in each country) (e.g., Hox, 2010:15). For level 1, the ICC is σ^2 level 1/ (σ^2 of level 1+ σ^2 of level 2); for level 2, the denominator is replaced by the variance of level 2.

research, even within highly regulated countries. In essence, our evidence suggests that managers may have incentives to disclose more about their mandated risks, resulting in variations in MRR between firms. Investors may require higher rates on their investments in higher-risk firms, and may overestimate required rates in the absence of adequate risk reporting (Healy and Palepu, 2001). As a result and consistent with the underpin arguments of our theoretical framework that managers may provide more risk disclosure to reduce investor uncertainty. Our results also suggest that managers of highly liquid firms may disclose more about risks included in the mandatory requirements in order to be consistent with the best practice, the normative aspect, by informing their investors and distinguishing themselves from managers perceived to manage liquidity less effectively (see, e.g., Marshall and Weetman, 2007). These findings therefore support **H1a** rather **H1b**.

Regarding the other firm characteristics, Model 1 (Table 4) also indicates that large firms, poorly performing firms, and lower-dividend-paying firms are likely to exhibit significantly higher levels of MRR. Managers at these firms may have a greater ability to collect and prepare information at a lower average cost (e.g., Healy and Palepu, 2001). Managers of such firms may also have a greater incentive to disclose risk information. These results are consistent with prior literature on risk reporting (e.g., Miihkinen, 2012; Elshandidy et al., 2013).

Model 1 (Table 4) also shows that firm characteristics explain 52.2% (adjusted-R^2) of all MRR variations between firms across these countries. At the same time, these variations decrease by 25% compared to the null model, to 62%, at a p-value of 0.000. The variations in MRR within firms over 2005 to 2010 increase significantly, compared with the null model, to 35%, at a p-value of 0.000. These results therefore suggest that simply considering firm characteristics improves the model's ability to explain the variations in MRR between firms, and reduces the unexplained variations between firms across the three countries, rather than the unexplained variances within firms over the five years considered.

In Models 2 to 6, where we consider country characteristics, we find that market-wide risk (a high covariance in market returns) is the only risk factor considered that significantly influences firms across our three countries, increasing the level of MRR provided. This result is consistent with the theory and

empirical research discussed earlier. Additionally, we find that large, less profitable and high-growth firms are likely to provide significantly higher levels of MRR than other firms, at p-values of 0.000, 0.011 and 0.051, respectively. The above results suggest that we should accept **H1a**.

Under Models 2-6, we find that the legal system and cultural values have a significant influence on MRR variations, at p-values of 0.000. The interpretations of these effects are subject to the combination of legal system and cultural values. Particularly, when we combine a country's legal system and its score for UA, IND, or LTO, we find that firms in the code law country (Germany) exhibit significantly higher levels of MRR than firms in the common law countries (the UK and the US). The results also show that a country's legal system and its UA, IND and LTO scores convey the same information, explaining why firms vary in disclosing their MRR. This result indicates that firms from countries with higher (lower) UA and LTO (IND) scores, such as Germany, are more likely to provide significantly higher MRR than firms from low (high)-score countries. Firms from countries such as Germany are likely to provide more information about risk to avoid any possibility of increasing uncertainty about them in the eyes of investors. Furthermore, firms from countries with lower MAS scores, such as the US, are more likely to provide more mandated risk disclosure in their annual report narratives than those from high-MAS countries. These results are consistent with the prior empirical findings of Jaggi and Low (2000), Hope (2003) and Erkens (2012). Our results also suggest that, holding the legal system constant, PD, UA and LTO have identical impacts on MRR.

A remarkable improvement occurs in the model's ability to explain MRR variations once we include both legal and cultural exploratory variables. Hence, Models 2 to 6 in Table 4 show that both country and firm characteristics can explain around 79.2% of the MRR variations between German, British, and America firms. Including country factors in the model increases (by more than two thirds) its ability to explain MRR variation compared to the model including just firm characteristics. This is to be expected, because these factors might have a direct impact on each country's regulations, which in turn can be considered a principal determinant of the mandated risk indicator statements within each country, and thus an essential driver of MRR variations. These results imply that it is essential to consider the legal system and cultural values of a country, due to their significant and direct impact on

its mandatory practices. Accordingly, the intention to achieve international convergence, a major goal of the IASB, should be expanded from simply adopting a single set of high-quality accounting standards, the IFRS, to considering the legal systems and cultural values of countries around the world. These findings answer Doupnik and Tsakumis (2004)'s question about the extent to which the culture of a country influences its rules. Finally, these results support **H2.**

5.2.2. The impact of firm and country characteristics on VRR variations: Testing H1 and H2

The null model (Table 5) shows that approximately 49% (46% in the intercept and 3% in time) of the total variation in VRR is *between* firms, level 2, over the period from 2005 to 2010. The other 51% of the variation is *within* firms, level 1. All these variations are significant, at p-values of 0.000, which suggests that there is significant variation in the VRR at each level that can be explained by firm and country characteristics.

The results for Model 1 suggest that the variations in VRR are significantly influenced by low levels of volatility in firms' market returns and high covariance of the firms' market returns relative to the market index, at p-values of 0.081, and 0.000, respectively. The results also show that large firms are likely to exhibit significantly higher levels of variation in VRR, at p-values of 0.000. These results lead us to accept **H1a**.

Model 1 also suggests that firm characteristics explain more two-thirds (as adjusted-R^2) of the total variations in VRR between firms across Germany, the UK and US. The ICC shows, though, that approximately 34% (33% in the intercept and 1% in time) occurs between firms across countries over the years. This suggests that expanding Model 1 to include country characteristics in Models 2 to 6 might decrease the extant VRR variations, improving the model's ability to explain such variations.

Models 2 and 5 show that firms from common law countries, such as the UK and US, are likely to exhibit significantly higher levels of VRR variations than firms from code law countries, such as Germany, at p-values of 0.000. Considering the cultural values, we find that firms from countries with lower scores for PD, UA, IND, and LTO are likely to exhibit significantly higher variations in VRR, at p-values of 0.000. We also find that firms from countries with lower MAS scores seem to exhibit less variation in VRR than firms from other countries, at p-values of 0.000. In the same table, we can see

that larger and less profitable firms, and those with higher systematic risk are likely to reveal significantly higher levels of VRR than other firms at p-values of 0.000, 0.073 and 0.023, respectively. These results therefore support the acceptance of **H1a**.

However, Models 2 to 6 show very limited improvements, in terms of adjusted-R^2, compared with Model 1; there is just a 5.2% increase in these models' ability to explain variations in VRR between firms across Germany, the UK, and the US. These results suggest that such variations are more likely to be statistically correlated with firm characteristics that can be derived hypothetically based on managers' incentives. In essence, we find that both legal and cultural factors have less influence than such incentives in explaining variations in VRR between firms across countries.[10] Our results lead us to reject **H2**.

[Insert Table 5 about here]

5.3. Further analysis: Within country and financial crisis

We separate the above (cross-country) analysis into each individual country (within-country analysis, with 1,000, 1,410, and 1,270 firm-year observations in Germany, the UK and the US, respectively), as specified in Eq. 2, and as shown in Table 6.

$$RR_{tij} = \beta_{0ij} + \beta_{1ij} Z_{tij} + \beta_{2ij} Z_{tij}^{2} + \sum_{q=1}^{Qr} \beta_{rq} Xfl_{qij} + \sum_{q=1}^{Qo} \beta_{oq} Xfl_{qij} + \varepsilon_{tij} + r_{ij} \qquad (2)$$

In Germany, firms characterised by higher systematic risk, a larger size, and less profitability are likely to exhibit high variation in MRR. Meanwhile, high variations in VRR are likely to be significantly associated with lower volatility of market returns, higher systematic risk, higher financing risk, a larger size, and less profitability. In the UK, firm size and firm dividend, rather than risk levels, determine MRR variation. However, UK firms characterised by high systematic risk and a large size are likely to exhibit high variation in VRR. Finally, in the US, firms with highly volatile market returns, low liquidity

[10] To investigate this conclusion further, we analyse the impact of both legal and cultural values on the two components of total MRR, namely MRR_I and MRR_V, in the US and Germany. The results (not reported) confirm the significant impact of the legal system on MRR_I but not on MRR_V, which in turn supports the theory that providing additional information about mandated risk is more likely to be associated with the incentives of the firms' managers.

risk, a large size, low profitability and high growth exhibit significantly higher variation in MRR. Neither firm risk nor any other firm characteristic influences variation in VRR for US firms.

[Insert Table 6 about here]

These results suggest that, in Germany, variations in MRR and VRR reflect risk level variations (total, systematic, financing and liquidity risks). The results have many implications and support the respective regulatory approach adopted in each country by demonstrating the extent to which variations in MRR and VRR are more or less sensitive to variations in underlying risk. The UK results suggest that variations in VRR are more sensitive to a firm's risk level (systematic) than are MRR variations, which are influenced by firm size and dividends. In the US, variations in MRR are more sensitive to variations in a firm's risk levels (total and liquidity risks) than are variations in VRR.

To observe firms' behaviour over the recent financial crisis (2007/2008), we introduce three dummy variables, representing the periods before, during and after the crisis in 2007/2008 (all take the value 1 during the period in question and 0 otherwise). Our ordinary least squares (OLS) regressions suggest that firms tend to behave differently prior to and following the crisis relative to during. The observed responses vary subject to the disclosure type, as shown under Models 1 and 4 of Table 7 for MRR and VRR respectively, and subject to the joint estimation, which interacts the crisis's variables with country, as shown under Models 2 and 3 of Table 7.

Specifically, Model 1 suggests that firms tend to comply more (less) with risk regulations post (pre)-crisis relative to during. Consistent with the neo-institutional theory, firms are likely to face a lot of pressure during and after crises, making the cost of non-compliance more severe (Oliver, 1991). Most firms will need to reassure the market about their financial performance and build trust in what they provide to the market. The results also suggest that US (UK) firms tend to exhibit more (less) risk information mandatorily than German firms. Model 2 of Table 7 confirms these findings when we look at the joint effects of the financial crisis (pre- and post- relative to during the crisis) and the countries under study (the UK and US relative to Germany). We find that both US and UK firms tend to comply more with the risk regulations following the crisis than during. This result suggests that firms are likely to continue exhibiting significantly higher levels of mandatory risk disclosure since those firms will be

under the markets' and regulators' attention. This, as a result, is likely to motivate such firms to apply effectively either current or any new emerged regulations. Model 3 of Table 7 suggests that firms are likely to provide less risk information voluntarily prior the crisis than they do during the crisis. The results also suggest that only UK firms are likely to exhibit higher levels of VRR than German firms. Model 4 confirms our findings under Model 3 and further explains that, while US firms tend to reassure the market with more voluntary risk information both before and after the crisis than during, UK firms are only likely to do so prior to the crisis.

[Insert Table 7 about here]

5.4. Robustness checks: Endogeneity problem

We check whether our previous estimates, shown in Tables 5 and 6, are subject to an endogeneity problem arising from omitted variables and/or simultaneity. The problem of omitted variables bias arises from unobserved heterogeneity of a firm-specific and/or time-invariant nature. Omitted variables might lead us to incorrectly attribute variations in risk disclosure to the variations in firm and country characteristics. This concern, though, can be eliminated by using fixed effects (e.g., Brown, Beekes, and Verhoeven, 2011). Our estimated fixed effects in Tables 5 and 6 control for any firm-specific and time-invariant effects that might influence a firm's decision to include risk information in the narrative sections of its annual report. Simultaneity or reverse causality arises in situations where significant variations exist between the explanatory variables and risk reporting (MRR and VRR). In such cases, one might claim (e.g., Frith, 1984; Kothari, Li, and Short, 2009; Kravet and Muslu, 2013) that firms that disclose high levels of risk information are likely to be riskier. To control against reverse causality, following Hoitash et al. (2009), we regress the current year's mandatory and voluntary risk disclosure scores on the previous year's market and accounting risk measures, as shown in the following equation:

$$RR_{tij} = \beta_{0ij} + \beta_{1ij} Z_{tij} + \beta_{2ij} Z^{2}_{tij} + \sum_{q=1}^{Qr} \beta_{rq} Xfl_{qijt-1} + \sum_{q=1}^{Qo} \beta_{oq} Xfl_{qij} + \sum_{q=1}^{Qc} \beta_{cq} Xcl_{qij} + \varepsilon_{tij} + r_{ij} \quad (3)$$

Our results, shown as Model 7 in Table 5 for MRR, and Table 6 for VRR, show that the coefficients of the lagged values of the market and accounting risk measures are statistically consistent with our results in Models 1 and 2, and have theoretically plausible signs. Moreover, the size of the

coefficients and the explanatory power of the model remain qualitatively similar to those in Model 1. Our results therefore support a firm's risk level being an important factor in the variation in risk reporting.

6. Concluding remarks

We associate variations in both MRR and VRR with variations in both firm characteristics (firm risk levels and control variables) and country characteristics (legal system and cultural values), across Germany, the UK and the US, over the period from 2005 to 2010. We find that the legal system and cultural values have significantly high explanatory power over MRR variations over time, even under the new approach of international convergence. They are less important in explaining the variations in VRR between firms across countries.

These results have theoretical and practical implications. They suggest that more attention should be paid to variables that may explain the variations in MRR and/or VRR within firms over time. Our suggestion is consistent with a recent trend in the accounting literature (e.g., Bamber, Jiang, and Wang, 2010) for research looking more deeply at the demographic characteristics of managers (e.g., educational background, such as finance, accounting or legal; managers with military experience versus those without it). Bamber et al. (2010) find personal managerial styles to play a significant role in explaining the cross-sectional variations in voluntary financial disclosure, even after controlling for both economic and firm characteristics. The practical implication of our results lies in our empirical evidence relevant to the current international convergence efforts. Each country's legal system and cultural values should be considered in order to minimise divergences in the mandatory efforts. Also, managerial incentives within each country should be brought into play so as to minimise variations in their voluntary disclosure. Looking more closely at the variations in MRR and VRR within and between the firms in each country is useful for clearly identifying the extent to which the regulatory approach relies on either regulations (Germany and the US) or voluntary disclosure (the UK).

When we analyse each country separately, we find that German firms pay closer attention to their risks by disclosing significantly high levels of risk information mandatorily and/or voluntarily.

Furthermore, we find that UK firms pay closer attention to systematic risks than they pay to other risks, by disclosing significantly high levels of risk information voluntarily rather mandatorily. Additionally, the US firms pay close attention to total and liquidity risks by disclosing significantly more risk information mandatorily rather voluntarily. These results have theoretical and practical implications. Our evidence adds significantly to the disclosure literature by emphasising the importance of widening this research scope to pay more attention to variations above the mandated requirements (e.g., IFRS adoption), which provide a minimum amount of information to investors, responding to the pressure of coercive or regulative factors, as the neo-institutional theory suggests. It warrants the extension of those studies that do not distinguish voluntary from mandatory risk reporting (e.g., Linsley and Shrives, 2006; Abraham and Cox, 2007) when studying the incentives behind risk reporting.

In terms of practical implications, first, the results signal that organising risk reporting by formally implementing an accounting standard significantly improves the disclosure environment by encouraging the provision of more risk information either mandatorily or voluntarily, most importantly as a response to firm risk levels. Second, the results support the current trend in the UK regulations, which encourages firms to voluntarily disclose information about their risks rather than making such disclosure compulsory. Third, they support the regulatory trend in the US. US firms trust the market's ability to correct any overestimations of corporate uncertainties, and disclose more risk information.

Further research could usefully include some other explanatory variables in the model, which might decrease the unsystematic (idiosyncratic) unexplained variations in MRR and VRR *within* firms over the period from 2005 to 2010 (e.g., see Bamber et al., 2010). Future research might usefully increase the number of countries so as to account for higher levels of analysis (three or four levels, see e.g. Hox, 2010; Dong and Stettler, 2011). Previous research has examined the quality of aggregated risk reporting (e.g., Miihkinen, 2012); future research might investigate the comparative quality of mandatory and voluntary risk disclosure.

References

Abraham, S., & Cox, P. (2007). Analysing the determinants of narrative risk information in UK FTSE 100 annual reports. *The British Accounting Review,* 39(3), 227–248.

Abraham, S., & Shrives, P. (2014). Improving the relevance of risk disclosure in corporate annual reports. *The British Accounting Review*, 46(1), 91-107.

Aguilera, R.V. & Jackson, G. 2003. The cross-national diversity of corporate governance: Dimensions and determinants. *Academy of Management, 28*, 447-462.

Aguilera, R.V. & Cuervo-Cazurra, A. 2004. Codes of good governance worldwide: What is the trigger? *Organization Studies,* 25, 415-443.

Ahmed, K., & Courtis, J. K. (1999). Associations between corporate characteristics and disclosure levels in annual reports: a meta-analysis. *The British Accounting Review,* 31(1), 35–61.

Baginski, S. P., & Wahlen, J. M. (2003). Residual income risk, intrinsic values, and share prices. *The Accounting Review,* 78(1), 327–351.

Bagnoli, M., & Watts, S. (2007). Financial Reporting and Supplemental Voluntary Disclosures. *Journal of Accounting Research,* 45 (5), 885-913.

Bamber, L., Jiang, J., & Wang, I. (2010). What's my style? The influence of top managers on voluntary corporate financial disclosure. *The Accounting Review*, 85(4), 1131–1162.

Beattie, V., McInnes, B., & Fearnley, S. (2004). A methodology for analyzing and evaluating narratives in annual reports: a comprehensive descriptive profile and metrics for disclosure quality attributes. *Accounting Forum,* 28(3)*,* 205–236.

Beaver, W., Kettler, P., & Scholes, M. (1970). The association between market-determined and accounting-determined risk measures. *The Accounting Review,* 45(4), 654–682.

Brown, P., Beekes, W., & Verhoeven, P. (2011). Corporate governance, accounting and finance: A review. *Accounting and Finance*, 51(1), 96-172.

Campbell, D., Beck, A., & Shrives P. (2005). A note on comparative language interrogation for content analysis: the example of English vs. German. *The British Accounting Review*, 37(3), 339–350.

Campbell, J. L., Chen, H., Dhaliwal, D. S., Lu, H. & Steele, L. B. (2014). The information content of mandatory risk factor disclosures in corporate filings. *Review of Accounting Studies*, 19(1), 396-455.

Chavent, M., Ding Y., Stolowy, H., & Wang, H. (2006) Disclosure and determinates studies: an extension using divisive clustering method (DIV). *The European Accounting Review,* 15(2), 181–218.

Chen, J.C. & Roberts, R.W. 2010. Toward a more coherent understanding of the organization-society relationship: a theoretical consideration for social and environmental accounting research. *Journal of Business Ethics*, 97, 651-665.

Conover, W., & Iman, R. (1980). The rank transformation as a method of discrimination with some examples. *Communication in Statistics-Theory and Methods,* 9(5), 465–487.

Deshmukh, S. (2005). The effect of asymmetric information on dividend policy. *Quarterly Journal of Business and Economics*, 44 (1-2), 107–127.

Ding, Y., Hope, O.-K., Jeanjea, T., & Stolowy, H. (2007). Differences between domestic accounting standards and IAS: Measurement, determinants and implications. *Journal of Accounting and Public Policy,* 26(1), 1–38.

DiMaggio, P.J., & Powell, W.W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48, 147–160.

Dobler, M. (2008). Incentives for risk reporting – a discretionary disclosure and cheap talk approach. *The International Journal of Accounting,* 43(3), 184–206.

Dobler, M., Lajili, K., & Zeghal, D. (2011). Attributes of corporate risk disclosure: an international investigation in the manufacturing sector. *Journal of International Accounting Research*, 10(2), 1–22.

Dong, M. and Stettler, A. (2011). Estimating firm-level and country-level effects in cross-sectional analyses: an application of hierarchical modeling in corporate disclosure. *The International Journal of Accounting*, 46(3), 271–303.

Doupnik, T., & Tsakumis, G. (2004). A critical review of tests of Gray's theory of cultural relevance and suggestions for future research. *Journal of Accounting Literature,* 23, 1-48.

Dye, R. (1986). Proprietary and non-proprietary disclosures. *Journal of Business,* 59(2), 331-366.

Ecker, F., Francis, J., Olsson, P. and Schipper, K. (2009). A comparison of market-based and accounting-based descriptions of business risk (Working Paper, Duke University).

Einhorn, E. (2005). The nature of the interaction between mandatory and voluntary disclosures. *Journal of Accounting Researc*h, 43(4), 593-621.
Elshandidy, T., Fraser, I., & Hussainey, K. (2013). Aggregated, voluntary, and mandatory risk disclosure incentives: evidence from FTSE all share. *International Review of Financial Analysis,* 30, 320-333.
Erkens, M. (2012). Reporting incentives and enforcement: impact on corporate risk disclosure (Working Paper, German Economic Association of Business Administration).
Gow, I., Ormazabal, G., & Taylor, D. (2010). Correcting for cross-sectional and time-series dependence in accounting research. *The Accounting Review,* 85(2), 483–512.
Gujarati, D. (2004). *Basic econometrics (4th ed)*. New York: McGraw-Hill.
Haskins, M.E., Ferris, K.R. and Selling, T.I (1996). *International Financial Reporting and Analysis: A Contextual Emphasis*. Chicago: Irwin.
Healy, P., & Palepu, K. (2001). Information asymmetry, corporate disclosure, and the capital markets: a review of the empirical disclosure literature. *Journal of Accounting and Economics,* 31(1), 405–440.
Hill, P., & Short, H. (2009). Risk disclosures on the second tier market London stock exchange, *Accounting and Finance*, 49(4), 753–780.
Hofstede, G. (1991). *Cultures and organizations: Software of the mind: Intercultural cooperation and its importance for survival*. New York: McGraw-Hill.
Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations (2nd ed)*. London: Sage Publications.
Hoitash, R., Hoitash, U., & Bedard, J. (2009). Corporate governance and internal control quality: A comparison of regulatory regimes. *The Accounting Review*, 84(3), 839–867.
Hope, O.K. (2003). Firm-level disclosures and the relative roles of culture and legal origin. *Journal of International Financial Management and Accounting*, 14(3), 218-248.
Hox, J. (2010). *Multilevel analysis: Techniques and applications (3rd ed)*. Mahwah, NJ: Lawrence Erlbaum.
Institute of Chartered Accountants in England and Wales. (1997). *Financial reporting of risk: Proposals for a statement of business risk*. London: ICAEW.
Institute of Chartered Accountants in England and Wales. (1999). *No surprises: The case for better risk reporting*. London: ICAEW.
Institute of Chartered Accountants in England and Wales. (2011). *Reporting business risks: Meeting expectations*. London: ICAEW.
Jaggi, B., & Low, P. (2000). Impact of culture, market forces, and legal system on financial disclosures *International Journal of Accounting*, 35 (4), 495-519.
Jorgensen, B., & Kirschenheiter, M. (2003). Discretionary risk disclosure. *The Accounting Review,* 78(2), 449–469.
Jorgensen, B., & Kirschenheiter, M. (2012). Interactive discretionary disclosures. *Contemporary Accounting Research,* 29(2), 382–397.
Judge, W.Q., Douglas, T.J., & Kutan, A.M. 2008. Institutional antecedents of corporate governance legitimacy. *Journal of Management*, 34: 765-785.
Judge, W., Li, S., & Pinsker, R. 2010. National adoption of international accounting standards: An institutional perspective. *Corporate Governance: An International Review*, 18: 161-174.
Khurana, I., Pereira, R., & Martin, X. (2006) Firm growth and disclosure: an empirical analysis. *Journal of Financial and Quantitative Analysis,* 41(2), 357–380.
Kothari, S., Li, X., & Short, J. (2009). The effect of disclosure by management, analysts, and business press on cost of capital, return volatility, and analysts forecast: study using content analysis. *The Accounting Review,* 84(5), 1639–1670.
Kravet, T., & Muslu, V. (2013). Textual risk disclosures and investors' risk perceptions. *Review of Accounting Studies*, 18(4), 1088-1122.
La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1998). Law and finance. *Journal of Political Economy*, 106(6), 1113-1155.
Li, F. (2008). Do stock market investors understand the risk sentiment of corporate annual reports? (Working Paper, University of Michigan).
Li, F. (2010). Textual analysis of corporate disclosures: a survey of the literature. *Journal of Accounting Literature,* 29, 134-165.
Li, K., & Zhao, X. (2008). Asymmetric information and dividend policy. *Financial Management*, 37(4), 673–694.

Linsley, P., & Shrives, P. (2006). Risk reporting: a study of risk disclosure in the annual reports of UK companies. *The British Accounting Review,* 38(4), 387–404.

Marshall, A. and Weetman, P. (2002). Information asymmetry in disclosure of foreign exchange risk management: can regulation be effective? *Journal of Economics and Business,* 54(1), 31–53.

Marshall, A., & Weetman, P. (2007). Modelling transparency in disclosure: the case of foreign exchange risk management. *Journal of Business Finance and Accounting,* 34(5-6), 705–739.

Miihkinen, A. (2012). What drives the quality of firm risk disclosure? *The International Journal of Accounting,* 47(4), 437–468.

Oliver, C. (1991). Strategic responses to institutional processes. *Academy of Management Review*, 16, 145–179.

Scott, R. (1995). *Institutions and organizations.* Thousand Oaks, CA: Sage.

Wallace, R. S. O., & Naser, K. (1995). Firm-specific determinants of comprehensiveness of mandatory disclosure in the corporate annual reports of firms listed on the stock exchange of Hong Kong. *Journal of Accounting and Public Policy*, 14(4), 311–368.

Wang, M., & Hussainey, K. (2013). Voluntary forward-looking statements driven by corporate governance and their value relevance. *Journal of Accounting and Public Policy,* 32(3), 26–49.

Weaver, G.R., Trevino, L.K., & Cochran, P.L. 1999. Integrated and decoupled corporate social performance: management commitments, external pressures, and corporate ethics. *Academy of Management Journal*, 42 (5), 539-52.

Williams, M. (2004). An international investigation of associations between societal variables and the amount of disclosure on information technology and communication problems: The case of Y2K. *The International Journal of Accounting,* 39(71), 71-92.

Zarzeski, M.T. (1996). Spontaneous harmonization effects of culture and market forces on accounting disclosure practices. *Accounting Horizons*, 10(1), 18-37.

Tables and Figures

Table 1. Summary of variable definitions, measures and sources

Variable	Definition and measures	Sources		
Panel A: Dependent variables: Mandatory and voluntary risk reporting				
MRR	Mandatory risk reporting is risk information provided by firms as a response to a specific regulation. It is measured by the natural logarithm of the total number of statements that indicate risk based on the final risk word list and that contain at least one topic related to the final mandated topics or themes.	QSR version (6)		
VRR	Voluntary risk reporting is risk information provided voluntarily, aside from any specific risk regulations. Measured as the natural logarithm of the residual of aggregated risk reporting (ARR) after excluding MRR.	QSR version (6)		
Panel B: Independent variables: Firm characteristics (firm risk levels and control variables)				
TR	Total risk is the volatility of market returns, measured by the standard deviation.	Datastream		
SR	Systematic risk is the covariance of a firm's market return relative to a market index. The calculations are based on between 23 and 35 consecutive month-end prices of German, UK and US firms relative to the market returns of the FazAktien, FT All Share and S&P 500, respectively.	Datastream		
USR	Unsystematic risk is the volatility of firm-specific risk, which is the standard deviation of the standard error of the CAPM.	Datastream		
FR	Financing risk is the extent to which firms have problems related to debt, measured by leverage proxied by the ratio of total debt to total equity.	Worldscope		
LR	Liquidity risk is the extent to which firms have problems related to payments, measured by the current ratio, proxied by dividing total assets by total liabilities.	Worldscope		
SE	A firm's size, measured by the natural logarithm of total assets in local currency or US dollars.	Worldscope		
PE	A firm's profitability, measured by dividing net income before proffered dividends by the year-end common equity.	Worldscope		
GE	A firm's growth, measured by growth in earnings, or by the ratio of net sales growth (NS1-NS0/NS0).	Datastream, Worldscope		
DE	A firm's dividends, measured as dividend per share or dividend pay-out.	Worldscope		
LE	The length of the annual report, measured by the total number of sentences coded in the whole annual report.	SQR version (6)		
IE	Based on the Industry Classification Benchmark (ICB), eight industries are provided: materials, industrials, consumer goods, health care, consumer services, telecommunication, utilities and technology.	Thomson One Banker		
Panel C: Independent variables: Country characteristics (legal system and cultural values)				
LS	A country's legal system, measured as a dummy variable equal to 1 for common law (CML) and 0 for code law (CL) countries.	La Porta *et al.* (1998)		
Cultural dimensions		Hofstede (1991, 2001)		
		Germany	UK	US
PD	Power distance, which is the extent to which power is distributed equally within a society and the degree to which society accepts this distribution, from relatively equal to extremely unequal.	35	35	40
UA	Uncertainty avoidance, which is the degree to which individuals in a country prefer structured over unstructured situations, from relatively flexible to extremely rigid, to cope with risk and innovation; a low uncertainty culture emphasises a higher level of standardisation.	65	35	46
IND	Individualism, which is the degree to which individuals base their actions on self-interest versus the interests of the group.	67	89	91
MAS	Masculinity, which is a measure of a society's goal orientation: a masculine culture emphasises status derived from wages and position; a feminine culture emphasises human relations and quality of life.	66	66	62
LTO	Long-term orientation, which is the extent to which the society respects traditional, forward thinking.	31	25	29

This table provides the definitions and measures of risk reporting, as dependent variables, and firm and country characteristics, as independent variables. It also provides the source of each variable. To mitigate the influence of outliers, all continuous variables are winsorised by eliminating observations at the 1st and 99th percentile.

Table 2. Descriptive Statistics

	Germany				UK				USA			
	Mean	Standard deviation	Median	N	Mean	Standard deviation	Median	N	Mean	Standard deviation	Median	N
MRR	1.909	0.423	2.000	838	1.443	0.285	1.477	1,317	2.281	0.324	2.350	1,265
VRR	2.289	0.253	2.286	838	2.337	0.210	2.354	1,320	2.263	0.192	2.281	1,265
TR	0.505	0.263	0.526	841	0.333	0.282	0.244	1,321	0.647	0.251	0.697	1,265
SR	0.383	0.242	0.360	841	0.523	0.266	0.521	1,321	0.555	0.300	0.594	1,265
USR	0.435	0.262	0.345	841	0.385	0.256	0.468	1,321	0.661	0.242	0.686	1,265
FR	0.534	0.259	0.531	837	0.590	0.278	0.633	1,315	0.378	0.273	0.321	1,254
LR	0.503	0.259	0.527	830	0.351	0.248	0.314	1,306	0.650	0.270	0.724	1,261
SE	0.465	0.309	0.426	840	0.654	0.220	0.675	1,291	0.369	0.257	0.324	1,221
PE	0.495	0.259	0.484	829	0.613	0.271	0.660	1,263	0.388	0.280	0.332	1,204
GE	0.453	0.220	0.439	840	0.518	0.341	0.591	1,300	0.495	0.263	0.495	1,238
DE	0.553	0.270	0.594	769	0.684	0.222	0.728	1,093	0.299	0.158	0.238	1,159
LE	3.234	0.213	3.235	841	3.160	0.188	3.1629	1,321	3.190	0.146	3.199	1,265

This table provides descriptive statistics for all of the variables defined in Table 1.

Table 3. Correlation matrix (Pearson above diagonal and Spearman below)

	MRR	*VRR*	*TR*	*SR*	*USR*	*FR*	*LR*	*SE*	*PE*	*GE*	*DE*
MRR		0.207***	-0.451***	0.135***	0.261***	-0.161***	0.310***	0.135***	-0.294***	-0.021*	-0.429***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.224)	(0.000)
VRR	0.194***		-0.103***	0.137***	-0.101***	0.183***	-0.153***	0.374***	-0.008	-0.029*	-0.102***
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.636)	(0.094)	(0.000)
TR	0.358***	-0.133***		0.419***	0.447***	-0.303***	0.319***	-0.461***	-0.378***	0.064***	-0.566***
	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SR	0.142***	0.142***	0.419***		0.167***	-0.096***	0.071***	0.048**	-0.157***	0.017	-0.177***
	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.005)	(0.000)	(0.337)	(0.000)
USR	0.279***	-0.125***	0.447***	0.167***		-0.198***	0.259***	-0.368***	-0.376***	-0.052***	-0.433***
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
FR	-0.177***	0.204***	-0.304***	-0.096***	-0.198***		-0.499***	0.396***	0.116***	-0.048**	-0.263**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.014)	(0.000)
LR	0.325***	-0.180***	0.320***	0.072***	0.259***	-0.499***		-0.379***	-0.229***	0.009	-0.337***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.593)	(0.000)
SE	0.153***	0.431***	-0.460***	0.047***	-0.368***	0.397***	-0.379***		0.286***	0.023	0.387***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.138)	(0.000)
PE	-0.306***	0.004	-0.378***	-0.157***	-0.376***	0.117***	-0.230***	0.286***		0.172***	0.441***
	(0.000)	(0.832)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
GE	-0.022	-0.023	0.064***	0.016*	-0.053**	-0.048**	0.009	0.022	0.172***		-0.025
	(0.209)	(0.182)	(0.000)	(0.063)	(0.002)	(0.013)	(0.345)	(0.139)	(0.000)		(0.175)
DE	-0.447***	0.111***	-0.566***	-0.179***	-0.432***	0.264***	-0.339***	0.385***	0.431***	-0.025	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.165)	
LE	0.447***	0.770***	-0.018	0.113***	-0.053***	0.140***	-0.087***	0.318***	-0.065***	-0.013	-0.008
	(0.000)	(0.000)	(0.288)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.459)	(0.673)

This table shows the correlation analysis between the risk reporting variables and firm characteristics. The numbers above the diagonal are the linear Pearson coefficients; the numbers below the diagonal are the Spearman coefficients, and the p-values are given in parentheses. *, **, and *** indicate significance at 0.1, 0.05 and 0.01, respectively (all two-tailed). All variables are defined in Table 1.

Table 4. Estimates of fixed and covariance effects of the repeated measures multilevel analysis for mandatory risk reporting

	Null Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	1.785***	-1.044***	-0.875***	-0.875***	-0.875***	-1.703***	-0.875***	-0.227***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Total risk		0.071**	-0.001	-0.001	-0.001	-0.001	-0.001	-0.029
		(0.038)	(0.970)	(0.970)	(0.970)	(0.970)	(0.970)	(0.321)
Systematic risk		-0.014	0.069***	0.069***	0.069***	0.069***	0.069***	0.048**
		(0.563)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.038)
Unsystematic risk		0.085**	-0.028	-0.028	-0.028	-0.028	-0.028	-0.012
		(0.017)	(0.301)	(0.301)	(0.301)	(0.301)	(0.301)	(0.650)
Financing risk		-0.045	0.001	0.001	0.001	0.001	0.001	0.0562
		(0.144)	(0.996)	(0.996)	(0.996)	(0.996)	(0.996)	(0.260)
Liquidity risk		0.109***	0.034	0.034	0.034	0.034	0.034	0.056*
		(0.000)	(0.200)	(0.200)	(0.200)	(0.200)	(0.200)	(0.053)
Size effect		0.119**	0.120***	0.120***	0.120***	0.120***	0.120***	0.160***
		(0.013)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Profitability effect		-0.070***	-0.058**	-0.058**	-0.058**	-0.058**	-0.058**	-0.063***
		(0.006)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.007)
Growth effect		0.028	0.032*	0.032*	0.032*	0.032*	0.032*	0.035**
		(0.104)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.038)
Dividend effect		-0.180***	0.031	0.031	0.031	0.031	0.031	0.032
		(0.000)	(0.287)	(0.287)	(0.287)	(0.287)	(0.287)	(0.312)
Length effect		1.006***	0.941***	0.941***	0.941***	0.941***	0.941***	0.757***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Time	0.031***	0.015***	0.013***	0.013***	0.013***		0.013***	0.026***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
Legal system			-0.417***	0.410***	0.410***	-0.417***	0.410***	-0.462***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Power distance			-0.828***					-0.841***
			(0.000)					(0.000)
Uncertainty avoidance				-0.828***				
				(0.000)				
Individualism					0.828***			
					(0.000)			
Masculinity						0.828***		
						(0.000)		
Long-term orientation							-0.828***	
							(0.000)	
Industry effect		Included	Included	Included	Included	Included	Included	Included
Quadratic time	0.003	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded
	(0.233)							
ICC (VRM)	21%***	35%***	77%***	77%***	77%***	77%***	77%***	77%***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ICC (VI)	78%***	62%***	22%***	22%***	22%***	22%***	22%***	22%***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ICC (VT)	1%***	3%***	1%***	1%***	1%***	1%***	1%***	1%
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.241)
Adjusted-R^2 (VI)		51.2%	79.2%	79.2%	79.2%	79.2%	79.2%	80.6%
Change -2LL		685.48***	800.52***	800.52***	800.52***	800.52***	800.52***	869.22***
Change chi-square		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N-S	723	723	723	723	723	723	723	723
Ob	3,615	3,615	3,615	3,615	3,615	3,615	3,615	3,615

This table identifies the extent to which the firm and country characteristics are significantly related to MRR variations. It provides the results of two repeated measures multilevel analyses of the MRR. It gives the fixed and covariance estimates of the predictors using six models. *, **, and *** indicate significance at 0.1, 0.05 and 0.01, respectively (all one-tailed except when the sign is not predicted or mixed). The null model shows the impact of both (non-)linear components of time on MRR. This model also describes the shape of the firm's MRR trajectories and determines whether the initial intercept and the random slope of time vary across firms or not. The following models show how the predictive variables explain the variation in MRR *within* and *between* firms across the US, the UK and Germany. Model 1 explores the impact of firm characteristics, including firm risk levels and some control variables, on the MRR variations. The subsequent models (2 to 6) include the interaction between firm and country characteristics, including the legal system and Hofstede's five dimensions of culture; each model combines the legal system with one of those five dimensions. Model 7 introduces the lagged values of market and accounting risk measures in order to account for endogeneity. This table also shows the ICC (the intra-class correlation), which gives the proportion of variation at each level by dividing each level's variation by the total variation. Level 1 gives the variance of repeated measures (VRM) *within* firms over the five years (our time series), and level 2 the variance *between* firms, either on the intercepts (VI) or over time (VT). The calculation for level 1, for instance, is σ^2 of level 1/ (σ^2 of level 1 + σ^2 of level 2). R^2 explains the extent to which the overall model's predictors can implicitly explain the changes in MRR, and is calculated as (σ^2 *M1*- σ^2 *M2*/ σ^2 *M1)*. Hence, *M1* is the null model's variance component, whereas *M2* refers to the current model's predictors. Adjusted-R^2 is calculated as 1-(1-R^2)*n-1/n-k-1, where n is the total sample size and k is the total number of parameters. The change in -2 Log Likelihood (-2LL) is employed to assess each model's improvement over the null model, and the change in chi-square is used to examine such improvements statistically. The p-values of the t- and Wald Z-statistics are given in parentheses. N-S is the number of subjects under analysis and Ob is the number of observations of firm-years. All other variables' interpretations are as explained in Table 1.

Table 5. Estimates of fixed and covariance effects of the repeated measures multilevel analysis for voluntary risk reporting

	Null Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	2.230***	-0.041*	-0.178*	-0.178*	-0.178*	-0.087	-0.178*	0.150
	(0.000)	(0.066)	(0.075)	(0.075)	(0.075)	(0.380)	(0.075)	(0.181)
Total risk		-0.027*	-0.001	-0.001	-0.001	-0.001	-0.001	-0.023
		(0.081)	(0.993)	(0.993)	(0.993)	(0.993)	(0.993)	(0.172)
Systematic risk		0.049***	0.026**	0.026**	0.026**	0.026**	0.026**	0.017**
		(0.000)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.028)
Unsystematic risk		0.033	0.006	0.006	0.006	0.006	0.006	0.014
		(0.817)	(0.629)	(0.629)	(0.629)	(0.629)	(0.629)	(0.334)
Financing risk		0.014	0.016	0.016	0.016	0.016	0.016	0.022
		(0.282)	(0.204)	(0.204)	(0.204)	(0.204)	(0.204)	(0.137)
Liquidity risk		-0.007	0.015	0.015	0.015	0.015	0.015	0.010
		(0.955)	(0.255)	(0.255)	(0.255)	(0.255)	(0.255)	(0.560)
Size effect		0.082***	0.049***	0.049***	0.049***	0.049***	0.049***	0.081***
		(0.000)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.000)
Profitability effect		-0.014	-0.021*	-0.021*	-0.021*	-0.021*	-0.021*	-0.040***
		(0.221)	(0.073)	(0.073)	(0.073)	(0.073)	(0.073)	(0.004)
Growth effect		-0.004	-0.010	-0.010	-0.010	-0.010	-0.010	-0.002
		(0.557)	(0.212)	(0.212)	(0.212)	(0.212)	(0.212)	(0.816)
Dividend effect		0.012	-0.011	-0.011	-0.011	-0.011	-0.011	-0.014
		(0.387)	(0.454)	(0.454)	(0.454)	(0.454)	(0.454)	(0.419)
Length effect		0.766***	0.806***	0.806***	0.806***	0.806***	0.806***	0.687***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Time	0.059***	0.011*	0.0117**	0.011**	0.011**	0.011**	0.011**	0.012**
	(0.000)	(0.056)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.025)
Legal system			0.102***	0.012	0.012	0.102***	0.012	0.116***
			(0.000)	(0.255)	(0.255)	(0.000)	(0.255)	(0.000)
Power distance			0.090***					0.098***
			(0.000)					(0.000)
Uncertainty avoidance				0.090***				
				(0.000)				
Individualism					0.090***			
					(0.000)			
Masculinity						-0.090***		
						(0.000)		
Long-term orientation							0.090***	
							(0.000)	
Industry effect		Included	Included	Included	Included	Included	Included	Included
Quadratic time	-0.008***	Included	Included	Included	Included	Included	Included	Included
	(0.000)							
ICC (VRM)	51%***	66%***	70%***	70%***	70%***	70%***	70%***	73%
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ICC (VI)	46%***	33%***	29%***	29%***	29%***	29%***	29%***	26%
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ICC (VT)	3%***	1%***	1%***	1%***	1%***	1%***	1%***	1%
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Adjusted-R^2 (VI)		69.9%	75.1%	75.1%	75.1%	75.1%	75.1%	72.1%
Change -2LL		1061.61***	73.99***	73.99***	73.99***	73.99***	73.99***	300.81***
Change chi-square		(0.000)	(0.000)	(0.000)	(0.000))	(0.000)	(0.000)	(0.000)
N-S	724	724	724	724	724	724	724	724
Ob	3,620	3,620	3,620	3,620	3,620	3,620	3,685	3,685

This table provides the two repeated measures multilevel analyses of voluntary risk reporting (VRR) across Germany, the UK and the US. All variables' interpretations are as explained in the previous table.

Table 6. Estimates of the fixed and covariance effects of the repeated measures multilevel analysis for the mandatory and voluntary risk reporting variations

	Germany				UK				USA			
	Mandatory risk reporting		Voluntary risk reporting		Mandatory risk reporting		Voluntary risk reporting		Mandatory risk reporting		Voluntary risk reporting	
	Null Model	Model 1	Null Model	Model 1	Null Model	Model 1	Null Model	Model 1	Null Model	Model 1	Null Model	Model 1
Intercept	1.782***	-1.607***	2.238***	0.200	1.418***	-1.016***	2.213***	-0.137	2.184***	-1.785***	2.245***	-0.526**
	(0.000)	(0.000)	(0.000)	(0.405)	(0.000)	(0.000)	(0.000)	(0.189)	(0.000)	(0.000)	(0.000)	(0.017)
Total risk		-0.108		-0.105**		-0.002		-0.004		0.103*		0.025
		(0.143)		(0.011)		(0.959)		(0.804)		(0.051)		(0.354)
Systematic risk		0.237***		0.122***		0.021		0.036***		0.003		0.007
		(0.000)		(0.001)		(0.506)		(0.005)		(0.926)		(0.667)
Unsystematic risk		0.014		0.028		-0.014		0.003		-0.070		0.120
		(0.828)		(0.457)		(0.657)		(0.799)		(0.152)		(0.678)
Financing risk		0.022		0.108**		-0.026		0.015		0.023		-0.218
		(0.786)		(0.018)		(0.403)		(0.235)		(0.567)		(0.319)
Liquidity risk		0.046		0.057		0.007		0.016		0.075*		0.025
		(0.541)		(0.179)		(0.825)		(0.213)		(0.065)		(0.991)
Size effect		0.186**		0.296***		0.232***		0.134***		0.103**		0.020
		(0.045)		(0.037)		(0.000)		(0.000)		(0.048)		(0.490)
Profitability effect		-0.097*		-0.066**		-0.020		0.016		-0.057*		-0.021
		(0.093)		(0.035		(0.518)		(0.188)		(0.097)		(0.245)
Growth effect		0.097		0.032		-0.011		-0.011		0.072**		-0.012
		(0.110)		(0.311)		(0.532)		(0.131)		(0.012)		(0.422)
Dividend effect		-0.055		-0.006		0.080**		0.007		-0.060		0.034
		(0.331)		(0.855)		(0.049)		(0.923)		(0.355)		(0.340)
Length effect		0.979***		0.713***		0.821***		765***		1.055***		0.901***
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
Time	0.025**	-0.025**	0.061***	0.024*	-0.019**	-0.097***	0.102***	0.028***	0.080***	0.067***	0.095**	-0.017**
	(0.027)	(0.274)	(0.000)	(0.058)	(0.015)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.024)	(0.042)
Industry effect		Included		Included		Included		Included		Included		Included
Time quadratic	0.014** (0.016)	Included	-0.012*** (0.000)	Included	0.010*** (0.001)	Included	-0.013*** (0.000)	Included	-0.010*** (0.002)	included	-0.002 (0.940)	Excluded
ICC (VRM)	61%***	70%***	45%	85%***	49%***	77%***	31%***	58%***	61%	65%***	38%***	59%***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ICC (VI)	38%***	29%***	54%***	13%***	50%***	22%***	66%***	37%***	39%***	35%***	61%***	41%***
			(0.000)	(0.000)			(0.000)	(0.000)				(0.000)

	(0.000)	(0.000)			(0.000)	(0.000)			(0.000)	(0.000)		
ICC (VT)	1%**	1%	1%	2%*	1%***	1%	3%***	5%				
	(0.025)	(0.839)	(0.232)	(0.065)	(0.000)	(0.423)	(0.000)	(0.353)				
Adjusted-R^2 (VI)		49.8%		82.1%		70.9%		81.6%		79.3%		62.9%
Changes -2LL		263.86***		288.78***		148.81***		853.25***		204.21***		78.13***
Change chi-square		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
N-S	196	196	196	196	281	281	281	281	246	246	246	246
Ob	980	980	980	980	1,405	1,405	1,405	1,405	1,230	1,230	1,230	1,230

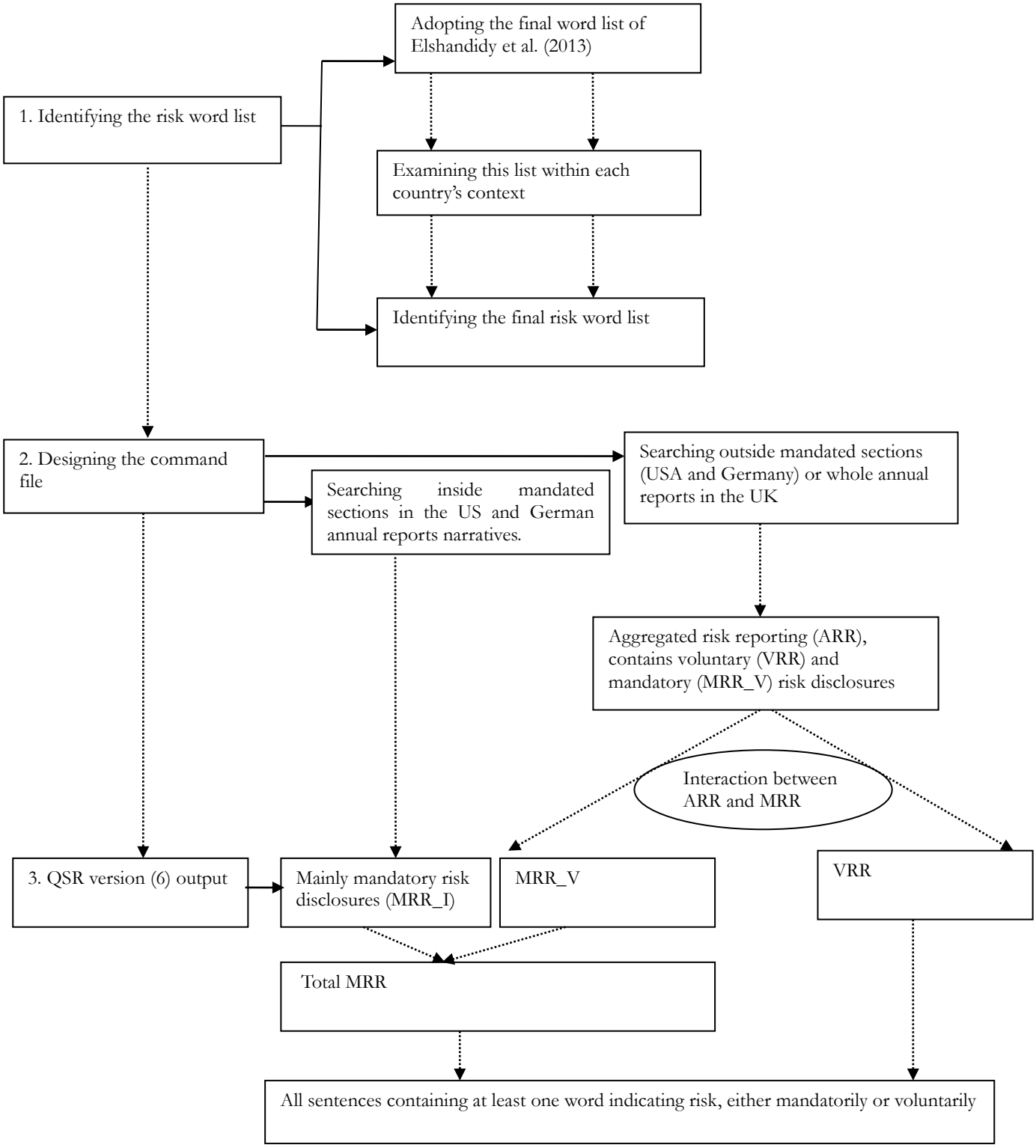
This table provides the results of the two repeated measures multilevel analyses of MRR and VRR for each country. All variables' interpretations are as explained for the previous table.

Table 7. OLS Regressions of mandatory and voluntary risk reporting before and after the financial crisis

	Mandatory risk reporting		Voluntary risk reporting	
	Model 1	Model 2	Model 3	Model 4
Intercept	-1.013***	-1.018***	-0.328**	-0.306***
	(0.000)	(0.000)	(0.000)	(0.000)
Total risk	-0.029	-0.013	0.012	0.009
	(0.324)	(0.644)	(0.487)	(0.512)
Systematic risk	0.138***	0.123***	0.109*	0.022*
	(0.000)	(0.000)	(0.061)	(0.100)
Unsystematic risk	-0.020	-0.023	0.008	0.008
	(0.361)	(0.289)	(0.498)	(0.472)
Financing risk	0.025	0.025	0.012	0.012
	(0.289)	(0.273)	(0.376)	(0.367)
Liquidity risk	0.066***	0.066***	0.038***	0.038***
	(0.009)	(0.000)	(0.005)	(0.000)
Size effect	0.130***	0.132***	0.076***	0.076***
	(0.000)	(0.000)	(0.000)	(0.000)
Profitability effect	-0.076***	-0.079***	-0.038***	-0.038***
	(0.001)	(0.000)	(0.002)	(0.003)
Growth effect	0.039**	0.047***	-0.009	-0.012
	(0.032)	(0.000)	(0.339)	(0.256)
Dividend effect	0.010	0.004	-0.009	-0.007
	(0.754)	(0.146)	(0.610)	(0.682)
Length effect	0.858***	0.869***	0.794***	0.792***
	(0.000)	(0.000)	(0.000)	(0.000)
Before the crisis	-0.031**	-0.102***	-0.026***	-0.038**
	(0.031)	(0.000)	(0.000)	(0.027)
After the crisis	0.041**	0.101**	-0.021*	-0.067**
	(0.023)	(0.019)	(0.054)	(0.021)
UK dummy	-0.429***	-0.477***	0.113***	0.101***
	(0.000)	(0.000)	(0.000)	(0.000)
US dummy	0.398***	0.367***	0.009	-0.024
	(0.000)	(0.000)	(0.392)	(0.169)
Before the crisis in UK		-0.116**		0.001
		(0.024)		(0.951)
After the crisis in UK		0.144***		0.062*
		(0.003)		(0.051)
Before the crisis in US		-0.072		0.033*
		(0.136)		(0.094)
After the crisis in US		0.068*		0.069**
		(0.065)		(0.029)
Industry-fixed effect	Included	Included	Included	Included
Correct for heteroskedasticity	Included	Included	Included	Included
Adjusted-R^2	68.7%	69.1%	57.6%	57.8%
F-value	429.32***	370.87***	72.21***	71.48***
Observations	3,026	3,026	3,030	3,030

This table presents ordinary least squares (OLS) regressions on the factors that influence mandatory and voluntary risk disclosures prior to and following the recent financial crisis. We introduce three dummy variables, representing the periods before, during and after the crisis in 2007/2008 (all take the value 1 during the period in question and 0 otherwise). Before and after the crisis in UK and US are the joint effects of the period of before and after the crisis with UK and US dummies. All variables' interpretations are as explained for the previous table. *, **, and *** indicate significance at 0.1, 0.05, and 0.01, respectively (all one-tailed except when the sign is not predicted or mixed).

Figure 1. Steps of the automated content analysis used to measure MRR and VRR



This figure provides details of how we constructed our word list and calculated the MRR and VRR scores using QSR version 6